12. (Twice Amended) The autostereoscopic image display device according to claim 1, wherein control of each of the divided areas is provided so as to supply an image for a dominant eye to the dominant eye of the viewer, when the viewer is outside the optimum viewing range for both eyes.

13. (Twice Amended) The autostereoscopic image display device according to claim 1, wherein the liquid crystal shutters of the shading means is structured so that the shading part disappears in an optional area so as to display a two-dimensional image on a display area corresponding to the optional area.

REMARKS

The Office Action dated June 14, 2002 has been received and carefully noted. Claims 1-6 and 8-13 are presently pending in the above application. The above amendments and following remarks, are submitted as a full and complete response thereto. By this Amendment, claims 1, 3, 8, 9,12 and 13 are amended. No new matter is added by the amendments. Therefore, consideration of claims 1-6 and 8-13 is respectfully requested.

The amendments to claims 1 and 13 filed on April 24, 2002 were objected to under 35 U.S.C. §132 because, the Examiner stated, it introduced new matter into the disclosure. With regard to claim 1 the Examiner stated that the shiftable shading part provided on both sides of the continuous part as recited in amended claim 1 is not disclosed in the original specification. Claim 1 has been further amended to cancel any new matter and thus overcome this rejection. With regard to claim 13, the Examiner stated that the feature of having a shading part which disappears in an optional region as recited in claim 13 is not supported by the Specification. Applicants respectfully point out to the Examiner the feature of the shading part disappearing in an optional area so as to display a two-dimensional image on a display area corresponding to the optional area is disclosed on page 7, lines 13-19 of the Specification. Thus Applicants respectfully request withdrawal of the objections to claims 1 and 13.

Claims 1-6 and 8-13 were rejected under 35 U.S.C. §112, first paragraph, as containing subject matter which was not described in the Specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention. The Examiner has based this rejection on the rejection under 35 U.S.C. §132 as discussed above.

As stated above, claim 1, as amended, and overcomes the rejection under 35 U.S.C. §132 as discussed above and the features of claim 13 are disclosed in the Specification. Therefore, Applicants respectfully request withdrawal of the rejection of claims 1-6 and 8-13 under 35 U.S.C. §112, first paragraph.

Claims 1-6 and 8-13 were rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Specifically the Examiner stated that the phrase "a liquid crystal shutter part ...a shiftable shading part provided on both the first and second sides of the continuous shading part" as recited in amended claim 1 is indefinite and in error because it is not clear how a shutter or shiftable shading part could be provided on both the first and second sides of the continuous shading part. The Examiner stated that there appears to be one shutter part provided at each side of the continuous shading part. In addition, the Examiner also stated that it is not clear what the relationship is between the "liquid crystal shutter part" and the "shiftable shading part"

Again, claim 1, as amended overcomes this rejection. Therefore, Applicants respectfully request withdrawal of the rejection of claim 1 under 35 U.S.C. §112, first paragraph.

Under the same rejection, the Examiner stated that the phrase "the shading barrier dividing control circuit" recited in claim 3 is indefinite because it lacks antecedent bases.

Claim 3 has been amended to overcome this rejection. Therefore, Applicants respectfully request withdrawal of the rejection of claim 3 under 35 U.S.C. §112, first paragraph.

The Examiner also stated that "the shading barrier means" recited in claim 8 is indefinite because it also lacks antecedent bases. The Examiner also stated that the

phrase "to observe pixels displayed on the liquid crystal panel" recited in claim 8 was wrong because the pixels are the elements in the liquid crystal display panel that enable image elements to be displayed and the pixels themselves cannot be displayed on the panel. In addition, with regard to claim 8, the Examiner also stated that it is not clear what is considered to be "the boundary part." Moreover, with regard to claim 8, the Examiner also renewed his rejection stated in the previous Office Action of October 24, 2001. In the previous Office Action, the Examiner stated that it was not clear what was meant by the phrase "aperture ratio equivalent to a boundary part of the dividing areas" Claim 8, as amended, overcomes these rejections. Therefore, Applicants respectfully request withdrawal of the rejection of claim 8 under 35 U.S.C. §112, first paragraph.

With regard to claim 9, the Examiner stated that claim 9 is confusing and indefinite because it is not clear what limitations are sought to be patented. Claim 9, as amended, overcomes the Examiner's rejection. Therefore, Applicants respectfully request withdrawal of the rejection of claim 9 under 35 U.S.C. §112, first paragraph.

With regard to claim 12, the Examiner renewed his rejection in the previous Office Action of October 24, 2001. Specifically, the Examiner stated in the previous Office Action that the phrase "to supply an image for a dominant eye to the dominant eye of the viewer" is vague and indefinite, because it is not clear what this phrase means.

Claim 12, as amended, overcomes the Examiner's rejection. Therefore, Applicants respectfully request withdrawal of the rejection of claim 9 under 35 U.S.C. §112, first paragraph.

With regard to claim 13, the Examiner stated that the phrase "the shading part" recited in claim 13 is indefinite because it is not clear whether it refers to the "continuous shading part" or the "shiftable shading part". Claim 13, has been amended to recite the "shiftable shading part," on thus overcome the Examiner's rejection. Therefore, Applicants respectfully request withdrawal of the rejection of claim 13 under 35 U.S.C. §112, first paragraph.

Claims 1-13 were rejected under 35 U.S.C. §102(e) as being anticipated by Hamagishi (U.S. Patent No. 6,049, 424). Applicant's respectfully traverse this rejection

because Hamagishi fails to disclose, teach or suggest all the features recited in the rejected claims.

Amended claim 1 recites an autostereoscopic image display device including an image display means for displaying a left eye image and a right eye image in alternately forming stripe-shaped patterns upon a liquid crystal display panel. Claim 1 also includes a sensor for sensing a position of a head of a viewer and a shading means comprising a continuous shading part with liquid crystal shutters provided on both sides of the continuous shading part for turning on and off based upon the position of the head of the view to generate a binocular parallax effect. Finally, claim 1 recites an area shifting and division control means for dividing the shading means into areas in a horizontal direction and controlling shifting of said liquid crystal shutters in each of the areas.

Hamagishi fails to disclose a shading means including a continuous shading part with liquid crystal shutters provided on both sides of the continuous shading part for turning on and off based upon the position of the head of the view to generate a binocular parallax effect. By turning on and off the liquid crystal shutters as recited in claim 1, the shading part is shifted.

Also, Hamagishi fails to disclose, teach or suggest area shifting and division control means for dividing the shading means into areas in a horizontal direction and controlling shifting of said liquid crystal shutters in each of the areas as recited in the present invention. This feature provides a stereoscopic image display device without glasses capable of ensuring a stereoscopic view in a position apart from an optimum viewing position with a great distance in back and forth positions.

Hamagishi merely discloses a shading barrier 10 with barrier movement means comprising liquid crystal shutters 31 and 32 arranged in both ends in the lateral direction of a slit 11 of the shading barrier, and a control unit for selectively turning the liquid crystal shutters 31 and 32 on and off upon input of an output of the above mentioned sensor (Column 8, lines 33-42). Hamagishi discloses a three dimension display device to laterally move the position of the shading barrier 10 to laterally move a normal view position or a reversed view position upon selectively turning liquid crystals shutters provided in both ends in the lateral direction of a slit of the shading barrier on and off by the barrier

movement means when the head of the viewer is in a moire position between the normal view position and the reversed view position. Thus, there is no teaching or suggestion by Hamagishi that a shading means includes a continuous shading part with liquid crystal shutters provided on both sides of the continuous shading part for turning on and off based upon the position of the head of the view to generate a binocular parallax effect. Also there is not teaching or suggestion by Hamagishi et al. of an area shifting and division control means for dividing the shading means into areas in a horizontal direction and controlling shifting of said liquid crystal shutters in each of the areas. Therefore claim 1 is patentable over Hamagishi et al. Thus, Applicant's respectfully request withdrawal of the rejection of claim 1 under 35 U.S.C. §102(e).

Claims 2-6 and 8-13 depend from claim 1 and are patentable for at least the same reasons discussed above with respect to claim 1. Thus, Applicant's respectfully request withdrawal of the rejection of claims 2-6 and 8-13 under 35 U.S.C. §102(e).

Moreover, with regard to claim 8, the Examiner stated that Hamagishi teaches that the shading barrier 10 which comprises a slit 11 which serves as an aperture. The Examiner states that the aperture ratio is implicitly chosen to allow the observer to view the images displayed on the liquid crystal panel. This rejection of claim 8 is respectfully traversed because Hamagishi fails to disclose, teach or suggest all the features recited in claim 8.

Claim 8, as amended, recites all the features of claim 1 as discussed above. In addition, claim 8 recites an aperture part having aperture ratio is provided on the shading means for permitting a viewer to observe images formed by pixels displayed on the liquid crystal panel. Claim 8 further recites that the aperture ratio configured to be equivalent to a boundary edge of divided areas of the shading means provided so that the aperture ratio and the boundary edge of the divided areas are approximately uniform

Referring to Fig. 7, Hamagishi merely discloses that when the line of sight passing through the center of each of the pixel apertures 21 from the right eye 2R which is moved by one-half of the distance between the eyes from the proper viewing position strikes the barrier 12 of the shading barrier 10, the sensor senses that the viewer cannot view normal 3D images in this position. Thus, the slit 11 of the shading barrier 10 may be moved so

that the center of the moire position becomes the center of the normal position (Column 8, lines 45-55). Thus, Hamagishi neither explicitly or implicitly discloses the aperture ratio as recited in claim 8. Therefore, claim 8 is patentable over Hamagishi. Thus Applicants respectfully request withdrawal of the rejection of claim 8 under 35 U.S.C. §102(e) over Hamagishi.

With regard to claim 9 the Examiner stated that Hamagishi discloses that the liquid crystal shutters sandwich the slit according to Figure 5. Applicants respectfully traverse this rejection because Hamagishi fails to disclose, teach or suggest all the features recited in claim 9.

Claim 9 recites an autostereoscopic image display wherein the liquid crystal shutter provided on both the first and the second sides of the continuous shading part sandwiching the aperture part which is equivalent to the boundary edge of each divided area is wired so as to be assigned in a same group of the liquid crystal shutter in an area adjacent to each divided area.

Referring to Figure 5, Hamagishi fails to disclose teach or suggest that the liquid crystal shutter is wired so as to be assigned in a same group of the liquid crystal shutter in an area adjacent to each divided area as recited in claim 9. Moreover, claim 9 depends from claim 9. Therefore, claim 9 is patentable over Hamagishi by its dependency from claim 8 and for the additional features recited therein. Thus Applicants respectfully request withdrawal of the rejection of claim 9 under 35 U.S.C. §102(e) over Hamagishi.

Claims 1, 3, 5, 6, 8-9 and 11-13 were rejected under 35 U.S.C. §103(a) as being unpatentable over Isono et al. (U.S. Patent No. 5,315,377) in view of Chikazawa (U.S. Patent No. 5,900,972). Applicants respectfully traverse this rejection because the combination of Isono et al. and Chikazawa fails to disclose, teach or suggest all the features recited in the rejected claims.

For example the combination of Isono et al. and Chikazawa fails to disclose teach or suggest a shading means comprising a continuous shading part with liquid crystal shutters provided on both sides of the continuous shading part for turning on and off based upon the position of the head of the viewer to generate a binocular parallax effect as recited in claim 1.

The Examiner admits that neither reference explicitly discloses a continuous shading part. However, the Examiner states that the addition of this feature would have been obvious to one of ordinary skill in the art given the teaching of Isono et al and Chikazawa.

However, Isono et al. merely discloses a parallax barrier that is electrically and programably displayed on the whole screen of the LCD panel 28 in the 3D mode and a portion of the screen in the (2+3) or (2+3)D) mode (Column 4, lines 32-36).

Moreover, Chikazawa merely discloses that a liquid crystal system 38 comprises strips of liquid crystal shutters 39 and 40 which are arranged along pixel columns and function as moving barriers 33. Chikazawa discloses that the liquid crystal shutters 39 and 40 can switch in dependence on the state from transparent to not-transparent and vice versa which give the same function to the moving barriers.

Consequently, there is no explicit or implicit suggestion in either reference that they be combined in the manner suggested by the Examiner in order to achieve a shading means that includes liquid crystal shutters provided on both sides of the continuous shading part for turning on and off based upon the position of the head of the viewer to generate a binocular parallax as recited in claim 1. Thus claim 1 is patentable over the combination of Isono et al and Chikazawa. Thus, Applicants respectfully request withdrawal of the rejection of claim 1 under 35 U.S.C. §103(a) over Isono et al and Chikazawa.

Remaining claims 3, 5, 6, 8-9 and 11-13 depend from claim 1 and would be patentable for at least the same reasons as claim 1, and for the additional features recited therein. Thus, Applicants respectfully request withdrawal of the rejection of claims 3, 5, 6, 8-9 and 11-13 under 35 U.S.C. §103(a) over Isono et al and Chikazawa

Claims 2, 4 and 10 were rejected under 35 U.S.C. §103(a) as being unpatentable over Isono et al. in view of Chikazawa as applied to claim 1 and further in view of Taniguchi et al. (U.S. Patent No. U.S. Patent No. 6,094,216). Applicants respectfully traverse this rejection because the combination of Isono et al and Chikazawa fails to disclose, teach or suggest all the features recited in claim 1 as discussed above. Claims 2, 4 and 10 depend from claim 1, therefore they are patentable for the same reasons as claim 1. Thus,

Applicants respectfully request withdrawal of the rejection of claim 2, 4 and 10 under 35 U.S.C. §103(a) over Isono et al., Chikazawa and Taniguchi.

In view of the distinctions discussed above, Applicants submit that the application is in condition for allowance with claims 1-6 and 8-13 contained therein.

Should the Examiner believe the application is not in condition for allowance, the Examiner is invited to contact Applicants' undersigned attorney at the telephone number listed below.

In the event this paper is not considered to be timely filed, Applicants respectfully petition for an appropriate extension of time. The Commissioner is authorized to charge payment for any additional fees which may be required with respect to this paper to Counsel's Deposit Account 01-2300, making reference to client matter number 107336-00008.

Respectfully submitted,

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Enclosure: Marked-Up Copy of Amended Claims

MARKED-UP COPY OF THE CLAIMS
U.S.S.N. 09/668,297

1. (Twice Amended) An autostereoscopic image display device comprising:

an image display means for displaying a left eye image and a right eye image in alternately forming stripe-shaped patterns upon a liquid crystal display panel;

a sensor for sensing a position of a head of a viewer;

a shading means comprising a continuous shading part [having a first and a second side and a liquid crystal shutter part for turning on and off, based upon the position of the head of the viewer, a shiftable shading part provided on both the first and the second sides of the continuous shading part to generate a binocular parallax effect] with liquid crystal shutters provided on both sides of the continuous shading part for turning on and off based upon the position of the head of the viewer to generate a binocular parallax effect; and

area shifting and division control means for dividing the shading means into areas in a horizontal direction and controlling shifting of [a] said liquid crystal shutters [shiftable shading part] in each of the areas.

3. (Twice Amended) The autostereoscopic image display device according to claim 1, wherein [the] a shading barrier dividing control circuit divides a display part of the image display means into areas to correspond to the divided areas of the shading means and controls a display order of the left eye image and the right eye image in each of the divided areas depending on the position of the head of the viewer.

8. (Twice Amended) [The autostereoscopic image display device according to claim 1,] An autostereoscopic image display device comprising:

an image display means for displaying a left eye image and a right eye image in alternately forming stripe-shaped patterns upon a liquid crystal display panel;

a sensor for sensing a position of a head of a viewer;

a shading means comprising a continuous shading part with liquid crystal shutters provided on both sides of the continuous shading part for turning on and off based upon

the position of the head of the viewer to generate a binocular parallax effect; and

area shifting and division control means for dividing the shading means into areas in a horizontal direction and controlling shifting of said liquid crystal shutters in each of the areas,

wherein an aperture part having aperture ratio is provided on the shading [barrier] means for permitting a viewer to observe images formed by pixels displayed on the liquid crystal panel;

the aperture ratio configured to be equivalent to a boundary [part] edge of divided areas of the shading means is provided so that the aperture ratio and the boundary [part] edge of the divided areas are approximately uniform.

9. (Twice Amended) The autostereoscopic image display device according to claim 8, wherein the liquid crystal shutter provided on both the first and the second sides of the continuous shading part sandwiching the aperture part which is equivalent to the boundary [part] edge of each divided area is wired so as to be assigned in a same group of the liquid crystal shutter in an area adjacent to each divided area.

12. (Twice Amended) The autostereoscopic image display device according to claim 1, wherein control of each of the divided areas is provided so as to supply an image for a dominant eye to the dominant eye of the viewer, when the viewer is outside the optimum viewing range for both eyes.

13. (Twice Amended) The autostereoscopic image display device according to claim 1, wherein the liquid crystal shutters [shading part] of the shading means is structured so that the shading part disappears in an optional area so as to display a two-dimensional image on a display area corresponding to the optional area.